A RATIONALE AND ALTERNATIVES FOR CONTROLLING NUTRIENTS AND EUTROPHICATION PROBLEMS IN THE CLARK FORK RIVER BASIN

SECTION 525 OF THE 1987

CLEAN WATER ACT AMENDMENTS

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I. EXECUTIVE SUMMARY

The Clark Fork River - Lake Pend Oreille - Pend Oreille River watershed is a primary environmental feature of western Montana, northern Idaho and eastern Washington. In the past, portions of the drainage, and particularly the headwaters of the Clark Fork River, have been described as among the most seriously polluted in the Pacific Northwest. However, the Clark Fork - Pend Oreille Basin remains a highly valued recreational resource and the central focus of nearly every major urban, industrial and agricultural activity in the region.

Concerns about environmental problems in the basin are not new, but in the past few years there has been increased public attention on water quality degradation and the need for a basin-wide approach to water quality management. Public interest groups, local governments, universities, industries, and state and federal agencies have committed funds and other resources to the goal of protecting and restoring the resource potential of the Clark Fork - Pend Oreille Basin.

In 1987, Congress responded to this increasing public interest by directing the U. S. Environmental Protection Agency to conduct an assessment of the extent and sources of cultural pollution in the three-state drainage basin area and to develop recommendations for pollution control. This mandate appeared in Section 525 of the 1987 federal Clean Water Act. Funding was subsequently appropriated for a three-year study beginning in 1988. State agencies were assigned responsibility by EPA to conduct investigations within their state boundaries and the project was coordinated by EPA Regions VIII and X and an interstate steering committee.

The Section 525 Project focused on the basin's most significant interstate water quality problem -- excessive nutrients and resulting cultural eutrophication, or enrichment.

Eutrophication manifests itself in the Clark Fork River in Montana as abundant developments of nuisance-attached algae that impair most designated uses of the river. In Idaho's Lake Pend Oreille, increasing growths of algae and other water plants and decreasing water clarity, especially in near shore areas, were the primary concerns. Lake Pend Oreille receives about 90 percent of its water from the Clark Fork River. In Washington, the Pend Oreille River is choked with nearly continuous growths of the water plant Eurasian milfoil that impede boat traffic and most other uses. The Montana Department of Health and Environmental Sciences, as the lead Montana state agency for the Section

525 Project, formulated a plan to: 1) determine the extent and magnitude of excessive algae production in the Clark Fork River, 2) identify and measure nutrient sources, and 3) develop nutrient level/biological response criteria. This information, together with Idaho and Washington study results, provided the basis for the development of water quality objectives and management alternatives for control of the eutrophication problem.

This report summarizes Montana's Section 525 assessment results and presents management options. It also serves as Montana's contribution to a Clark Fork - Pend Oreille Basin Management Plan that will help protect and restore beneficial water uses in the three-state drainage area.

II. INTRODUCTION

A. Background

In April 1984, former Montana Governor Ted Schwinden announced a long-range comprehensive study of the Clark Fork Basin to draw together fragmented information about the river and to develop a management plan for the future. The culmination of that effort was the release in 1988 of the Clark Fork Basin Project Status Report and Action Plan (Johnson and Schmidt, 1988). The document included a review of the resources and special issues affecting the basin, a summary of efforts underway to solve problems, and recommendations for future action. Along with controlling heavy metals pollution in the upper Clark Fork Basin, the problem of nutrients and algae growth was considered the highest priority issue. It was also ranked as the major water quality issue jointly affecting Montana and Idaho, and the one for which the least amount of predictive information was available. The Action Plan gave specific recommendations for addressing the nutrient problem. It also introduced a coordinated program to investigate the sources and fate of nutrients in the Clark Fork-Pend Oreille Basin. That program became Section 525 of the federal Clean Water Act Amendments of 1987.

B. Description of the Problem

The upper and middle reaches of the Clark Fork River are some of the most productive stream waters in Montana west of the Continental Divide from the standpoint of nutrient concentrations and the potential to grow algae (Bahls et al., 1979a, 1979b). High concentrations of the basic nutrients phosphorus and nitrogen found in the Clark Fork River promote the growth of nuisance levels of attached algae. These algae threaten or impair beneficial water uses in at least 211 miles of the Clark Fork River and its headwater tributary Silver Bow Creek (MDHES, 1990). Dense mats of filamentous algae in the Clark Fork above Missoula and heavy growths of diatom algae below Missoula, besides being aesthetically unattractive, impede irrigation and recreation (MDHES, 1988; Johnson and Schmidt, 1988; Watson, 1990, 1991; Ingman, 1992). Algae produce oxygen during daylight hours but at night, in the absence of photosynthesis, algal respiration can deplete the oxygen needed by fish and other aquatic organisms. Seasonally, as the algae die and decay, oxygen-demanding sludge deposits are formed, and water clarity and visual appeal of the river are reduced. The decaying organic matter has

also been implicated in the production of river foam, which is an aesthetic nuisance of considerable magnitude.

In the lower Clark Fork, concerns have focused on nutrient discharges to Idaho's Lake Pend Oreille, one of the largest near-pristine lakes in western North America. Lake Pend Oreille has experienced increased weed and algal growth in recent years, and attention has turned to the Clark Fork River, which supplies 90 percent of the lake's water (Watson, 1985; MDHES, 1985; Johnson and Schmidt, 1988; IDOHW, 1989; Frenzel, 1991; Woods, 1991).

When the river leaves Lake Pend Oreille, it is called the Pend Oreille River. In the state of Washington, the river is plagued with very dense growths of rooted aquatic plants (Eurasian milfoil) that have choked out most other uses, including boat traffic (Johnson and Schmidt, 1988; Pelletier and Coots, 1990; Coots and Carey, 1991; Coots and Willms, 1991; Coots, 1992).

C. Purpose, Scope and Organization of the 525 Project

The Clark Fork-Pend Oreille watershed encompasses about 26,000 square miles of the intermountain Northwest in the states of Montana, Idaho, and Washington. The Clark Fork River begins as a small stream in the Deer Lodge Valley and gradually increases in size as it is joined by numerous tributaries, including the Blackfoot, Bitterroot, and Flathead rivers. Some 350 miles from its headwaters, the Clark Fork River flows into Lake Pend Oreille, Idaho's largest lake and the source of the Pend Oreille River in northeastern Washington. Where the Clark Fork crosses the Montana-Idaho border, it is Montana's largest river in terms of volume.

The Clark Fork has long suffered from a wide variety of water quality problems. The most acute are heavy metals pollution from past mining and smelting activities in headwaters areas, and eutrophication (or enrichment) problems caused by excess nutrients from a variety of sources. Other serious concerns include agricultural dewatering; sediment inputs and habitat destruction from road construction, timber harvest, farming, grazing, and mining; fluctuating streamflows and other impacts from hydroelectric dams, and the discharge of toxic substances from industrial and municipal wastewater facilities. Concerns over water quality in the basin, and recognition of the need for interstate planning, prompted the Clark Fork-Pend Oreille Coalition to lobby Congress for a

comprehensive basin-wide water quality assessment. Members of the three states' Congressional delegations responded by adding language to the Clean Water Act amendments of 1987 to authorize such a study. Section 525 of the amendments states:

"The Administrator shall conduct a comprehensive study of the sources of pollution in Lake Pend Oreille, Idaho, and the Clark Fork River and its tributaries, Idaho, Montana, and Washington, for the purpose of identifying the sources of such pollution. In conducting such study, the Administrator shall consider existing studies, surveys, and test results concerning such pollution. The Administrator shall report to Congress the findings and recommendations concerning the study conducted under this section."

Under the guidance of EPA Regions VIII and X, the states of Montana, Idaho and Washington were each directed to conduct water quality evaluations in portions of the basin within their states. The Water Quality Bureau in the Montana Department of Health and Environmental Sciences was designated as the lead agency for the Montana portion of the study. An interstate steering committee composed of representatives from the three states was established to coordinate the project. Funding was appropriated, and the project was formally initiated in July 1988.

The Section 525 study emphasized the nutrient/eutrophication problem because it was the primary interstate water quality issue and the one affecting the largest portion of the basin. The more acute mining-related problems of the headwaters area were not addressed in this study because investigations and remedial activities are already well underway through the federal Superfund Program. The Section 525 studies were expected to provide a basin-wide evaluation of the extent and sources of cultural pollution in Lake Pend Oreille and the Clark Fork River and a strategy for control of the problem.

III. ASSESSMENT APPROACH AND RESULTS

A. Study Objectives

About 22,000 square miles, or 85 percent, of the entire Clark Fork-Pend Oreille watershed lie within the state of Montana. Thus, Montana has regulatory responsibility for water quality in the majority of the drainage and for the largest share of actual or potential pollution sources. With the study emphasis on eutrophication problems in the three-state area, Montana recognized an immediate need to identify the major sources of nutrients in its portion of the watershed and to formulate a control strategy.

Nutrients are not conventional water pollutants in that given concentrations may cause different effects in different aquatic systems. Universal nutrient standards for the prevention of eutrophication problems are not available. Another confounding factor is that nutrients behave differently in rivers than in lakes. In most situations, site-specific studies are required to document problems and to develop nutrient criteria. Other study objectives reflected these concerns and included: 1) documenting the extent and severity of nuisance algae problems in the Clark Fork River, 2) reviewing available scientific literature on factors regulating algae levels in flowing water and the relationship between quantities of algae and beneficial water uses, 3) developing nutrient criteria for the control of algae in the Clark Fork, 4) predicting the changes in river algae levels which could be expected with nutrient controls, 5) evaluating the effects on fisheries of nutrient controls, and 6) developing a computerized Geographic Information System (GIS) to help assimilate all the study results.

Concurrent with Montana's effort, Idaho researchers evaluated the status of Lake Pend Oreille and modeled the effects of nutrient increases and reductions. Washington researchers investigated the factors responsible for the extensive weed growth in the Pend Oreille River and experimented with different weed control strategies. It was the intent of the Section 525 steering committee to incorporate the results of all these studies into a single, basin-wide management strategy. This report serves as Montana's contribution to that plan.

B. Study Methods

A brief summary follows of the assessment approach Montana researchers used to fulfill the study objectives:

1. Documentation of the Nuisance Algae Problem

Early on in the study, EPA Region VIII contracted with the Environmental Monitoring Systems Laboratory (EMSL) in Las Vegas to provide aerial remote sensing support to the 525 project. Part of EMSL's work included aerial photography, photographic interpretation, and the development of maps showing the distribution of nuisance algae and aquatic macrophytes throughout the Clark Fork River. Results of these investigations were presented in several reports (James, 1989; Hewitt,1991).

Concurrent with this work, University of Montana researchers under contract with the Montana Department of Health measured levels of attached algae (or standing crops) at various locations in the Clark Fork River. The general distribution and types of algae were noted as well as the reaches of river which supported the highest algal densities (Watson, 1989a).

Water Quality Bureau staff also gathered and reviewed information on dissolved oxygen concentrations in reaches of the upper and middle Clark Fork River which supported heavy algae growths (MDHES, 1985; Kerr, 1987a, 1987b; Watson, 1989b, 1989c; City of Missoula,1988-1991).

2. Development of Clark Fork River Nutrient Criteria

An extensive literature review was performed to determine what levels of algae interfere with beneficial water uses and what factors control the amount of algae in rivers. This information provided the basis for a series of artificial stream experiments conducted by the University of Montana. Artificial stream channels were constructed then fed with Clark Fork River water that was spiked with various concentrations of nitrogen and phosphorus. The response of algal growth rates and maximum standing crops to changes in nutrient levels was carefully measured. The experimental findings were used to develop specific nutrient criteria for the control of algae in the Clark Fork River (Watson, 1990).

3. Predicting the Response of Algae to Nutrient Reductions

As a follow-up to the artificial stream studies, a computer model was developed to answer the following questions: 1) How much reduction in nutrient concentrations in the Clark Fork is required to achieve a given level of reduction in attached algae, especially at those locations which support nuisance levels?, and 2) How much increase in nutrients is required to produce a given increase in algae, especially in those areas considered to have acceptable levels of algae now? The results of this modeling work were discussed in a contract report by the University of Montana (Watson, 1991).

4. Evaluating Potential Fisheries Effects of Nutrient Controls

Reducing instream concentrations of metals and many other pollutants frequently results in better living conditions for aquatic life. However, too low nutrient concentrations can reduce the fertility and productivity of aquatic ecosystems. In order to evaluate the potential tradeoffs of nutrient control measures in the Clark Fork Basin, a literature and data review was done to provide information on the potential effects to resident river fisheries. Findings were presented in a contract report by Ecological Resource Consulting (Knudson, 1991).

5. Nutrient Source Assessment

From 1988 to 1991, an intensive monitoring program was conducted to identify and rank the major point and nonpoint sources of phosphorus and nitrogen in the 340 miles of the Clark Fork River from its headwaters to the Idaho border. The monitoring network included 19 stations on the Clark Fork River, 34 stations on tributary streams, and 10 municipal and industrial wastewater discharges. Samples were collected and analyzed, and streamflows or discharge rates were gauged up to 45 times at each location. Nutrient concentrations were compared to criteria for the control of nuisance algae, and nutrient discharge rates were used to develop a budget of nutrient sources. Findings of this work were evaluated in three interim reports and a final report (Ingman and Kerr, 1989; Ingman, 1990, 1991, 1992).

Standardized stream reach assessments were performed in 272 segments of 99 tributaries in the Clark Fork Basin during 1990 and 1991. These surveys were done to provide information on the

sources and causes of nonpoint source pollution (e.g., types of impairment associated with specific land use activities) in tributary watersheds. The assessed streams were selected from a list of severely and moderately impaired streams published in the 1990 305(b) report (MDHES, 1990).

The nonpoint source stream reach assessment is a standardized procedure that subjectively evaluates 22 categories of stream and riparian conditions as well as land use. Assessment categories are numerically rated and then summed to provide an overall impairment value that reflects the stream's ability to support beneficial uses (MDHES, 1991). Assessments were conducted by OEA Research and summarized by the Water Quality Bureau (Tralles, 1992).

6. Geographic Information System

The Montana Department of Health contracted with the Montana State Library's Natural Resource Information System from 1989 to 1992 to develop a Geographic Information System (GIS) for the Clark Fork Basin. GIS technology is a relatively new and powerful computer-based tool for the analysis of environmental problems in a spatial context. The Clark Fork GIS was developed 1) to help Montana project personnel with the management and interpretation of the Section 525 assessment data, 2) as an aid to project-related decision making, and 3) to facilitate the communication of water quality problems and project results to the general public. The development of the system and GIS project accomplishments have been described in numerous progress reports and two annual reports (Jarvie, 1991, 1992). The Clark Fork GIS is housed at the Montana State Library and will see continuing use as a powerful water quality management planning tool.

A GIS was also developed exclusively for the Blackfoot River watershed by staff of the Environmental Monitoring Systems Laboratory in Las Vegas under contract with EPA Region VIII. The system was a pilot scale application of GIS technology as a basin-wide water quality management tool. The Blackfoot GIS includes a nonpoint source pollution model which has the ability to predict changes in streamflow, surface erosion, soil mass movement, and sediment discharge resulting from various land management prescriptions. The ultimate goal of the project is to develop a decision support system for developing management alternatives for the Blackfoot Basin (James, 1989, 1991; Hewitt, 1991). The Blackfoot GIS is housed at the Montana State Library.

C. Overview of Key Findings

Brief summaries are given below of the major conclusions of Montana's portion of the Section 525 assessment. These key findings provide the foundation for the development of management alternatives.

1. Documentation of the Nuisance Algae Problem

It is important to know where in the river the problem is located and how bad the problem is before cures can be prescribed. The highest densities of attached algae in the upper Clark Fork (measured as chlorophyll) were found between Drummond and the Blackfoot River confluence and in the middle reaches of the Clark Fork between Missoula and Harper Bridge. The highest average algal levels in the upper Clark Fork were four times the level proposed to protect against undesirable changes in the aquatic community, and eight times the level recommended to protect recreation and aesthetics (Nordin, 1985). Algal levels in the middle Clark Fork were three times and six times the recommended values, respectively. Smaller violations of these criteria were found throughout the Clark Fork from its headwaters to the Flathead River confluence. Algal respiration contributed to dissolved oxygen levels below the applicable state water quality standards at a number of locations within this segment of the river. When citizen complaints, dissolved oxygen violations, and algae criterion excursions are all considered, nuisance algae levels most severely affected the Clark Fork from Deer Lodge to Turah and from Missoula to Alberton. Reaches of the Clark Fork River with nuisance algae and related problems are shown in Figure 1.

2. Nutrient Criteria

The successful control of attached algae in the Clark Fork depends upon an understanding of the factors which limit their growth rates and densities, or standing crops. When limiting factors are identified, criteria or target levels can be developed. A number of factors influence algal levels, including the type of algae, streamflow patterns, water temperature and velocity, grazing by aquatic insects, light levels, and nutrient concentrations. However, factors other than nutrients are nearly impossible to control. As a result, criteria development focused on nutrients and in particular: 1) what

concentrations limit algal development?, 2) when and where are nutrients limiting algal development in the Clark Fork?, and 3) which nutrient (phosphorus or nitrogen) is most often limiting algal development?

Experimental results indicated that levels of attached diatom algae in the middle Clark Fork continued to increase in response to nutrient additions up to 30 μg/l for soluble phosphorus and 250 μg/l for soluble nitrogen. These values were established as "saturation" concentrations below which diatom algae standing crops could be reduced. Much of the Clark Fork was often found to be below these levels, hence any reduction in nutrients would be expected to reduce algal levels. Further, it was determined that management of either phosphorus (P) or nitrogen (N) should reduce nuisance algae levels, because either P or N, or both, were found to limit diatom algae levels for significant periods of the year in almost all areas.

The nuisance alga that dominates the upper Clark Fork is a filamentous green variety called Cladophora. It may respond to nutrients somewhat differently than the diatom-dominated communities. Heavy growths of Cladophora are seen in the upper Clark Fork even where nutrient levels are consistently well below 30 μg/l P and 20 μg/l N. Even if Cladophora levels are reduced by controlling nutrients, they may still be perceived as being at nuisance levels because of their ability to persist in relatively low-nitrogen environments and because of their filamentous, highly visible nature. It is likely that Cladophora levels in the upper Clark Fork can be controlled through management actions but probably cannot be eliminated.

How much reduction in nutrients is required to achieve successful control of the nuisance algae problem and its effect on beneficial water uses? This question is not easy to answer. Decreases in algal levels, especially for diatom algae, can be expected with reductions in P and N concentrations below 30 and 250 μg/l, respectively. However, target concentration levels where all water uses would be protected are not available. A suggested approach is to set summer nutrient target levels at the nutrient concentrations found in reaches of the Clark Fork where algae are not a frequent problem. Management actions to achieve these levels could be implemented and monitoring continued to evaluate whether water quality goals were being met. These proposed summer target levels are 6 μg/l or less for P and 30 μg/l or less for N. These concentration ranges are typical of the Clark Fork from

Turah to Missoula and from Alberton to the Idaho border during the months of July through September. Nutrient controls necessary to meet these restrictive levels throughout the river may not be feasible. However, lesser nutrient reductions can still have positive benefits on the restoration of beneficial water uses.

Proposed nutrient target levels for the Clark Fork River in relation to saturation levels and present summer levels are shown in Figure 2.

3. Nutrient Modeling

It is important to evaluate the expected benefits of nutrient control measures in the Clark Fork Basin because some control options are expensive. Estimating reductions in algae levels associated with various nutrient control alternatives can help decision making by providing a measure of costs versus benefits as well as the relative effectiveness of different measures. The artificial stream study results were incorporated into a realistic, well validated computer model that is capable of answering these questions. Computer modeling of a phosphate detergent ban at Missoula, for example, predicted at least a 40 percent reduction in algal levels in 100 miles of the Clark Fork during low streamflow conditions. The model is available to help evaluate the additional nutrient control alternatives in this report.

4. Fisheries Investigation

Before a strong argument for nutrient control can be made, it is important to consider the potential tradeoffs, or negative effects to other beneficial water uses, that might result. The effects on Clark Fork River fish production was the primary concern. This study concluded that the possible effects of nutrient reductions on fish food availability were very small when compared to other problems facing the river's trout fishery. These problems include toxic metals, sediment deposition, habitat degradation, limitations to spawning and recruitment, and predation by squawfish. It was considered improbable that the control of human-caused nutrient sources could lead to limitations in trout production, even if all other problems were successfully mitigated. Questions related to the possible

effects of nutrient control measures in the Clark Fork Basin on sportfish production in Lake Pend Oreille were not addressed in this investigation.

5. Nutrient Sources

The nutrient source assessment provided an answer to the question of where the nutrients in the Clark Fork River come from. It was determined that approximately half of the soluble phosphorus (the form most readily available for use by algae) came from wastewater discharges, while the remainder came from tributary inflows. About three-fourths of the soluble nitrogen came from tributaries, with the remaining one quarter coming from wastewaters.

Of the wastewater discharges (or point sources), the vast majority of nutrients come from just four sources-- the Missoula, Butte and Deer Lodge municipal wastewater treatment plants, and the Stone Container Corporation kraft mill at Frenchtown. These sources also provide the largest share of nutrients to the reaches where, and during the times of year when, algae and related problems are most prevalent. Tributary (or nonpoint) sources of soluble nutrients are dominated by the largest in the basin-- the Flathead, Bitterroot and Blackfoot rivers. Up to half of the nitrogen in the lower Bitterroot River during summer comes from contaminated groundwater seepage from the Missoula area. Just four small tributaries to the lower Flathead River are responsible for a large share of the nutrients discharged by that stream. Silver Bow Creek and about a third of the other evaluated tributaries were found to have high nutrient concentrations but smaller nutrient discharges. Their inflows could help nourish the excessive algae colonies in the Clark Fork below their confluences.

Inflowing water from cleaner tributaries such as Warm Springs and Rock creeks, and the Little Blackfoot, Blackfoot, Bitterroot, and Flathead rivers help dilute nutrient concentrations in the Clark Fork.

Tributary and point source discharges of nutrients to the Clark Fork River are summarized in Figures 3 and 4.

The basin-wide nonpoint source stream reach assessment helped identify the sources and causes of elevated nutrients in Clark Fork Basin tributaries. They also provided overall assessments of stream condition and use-support, as affected by a wide variety of pollution problems.

Of the 99 streams surveyed, 65 percent were given an overall rating of "impaired" (partial or non-support of the stream's designated uses). Fifty-seven percent of the 272 individual reaches examined within those 99 streams were rated as impaired. Geographically, the largest share of nonpoint source problems was found in the upper Clark Fork and Blackfoot River basins, where more than two-thirds of the assessed streams were rated as impaired. Conditions were marginally better in the Clark Fork River drainage below Missoula and in the Bitterroot Valley, where 45 and 33 percent of the assessed streams, respectively, were rated as impaired.

Land use activities in impaired drainages were dominated by grazing (75% of all reaches), followed by road construction (44%), and mining, logging and irrigation (20%). It should be noted that these activities, in many cases, occurred in unimpaired drainages as well. Within individual streams, impaired reaches frequently were located in the lower valleys, where agricultural land uses were dominant. Observed pollution sources contributing to impaired ratings were sedimentation (affecting 85% of the reaches), streambank instability (58%), animal waste in or near streams (31%), and damage to streamside vegetation (30%). All of these sources are believed to contribute nutrients to the Clark Fork watershed.

Major findings of the Clark Fork Basin nonpoint source stream reach assessment are presented in Figure 5.

Figure 1
Levels of Algae in the Clark Fork River from Chlorophyll Analyses

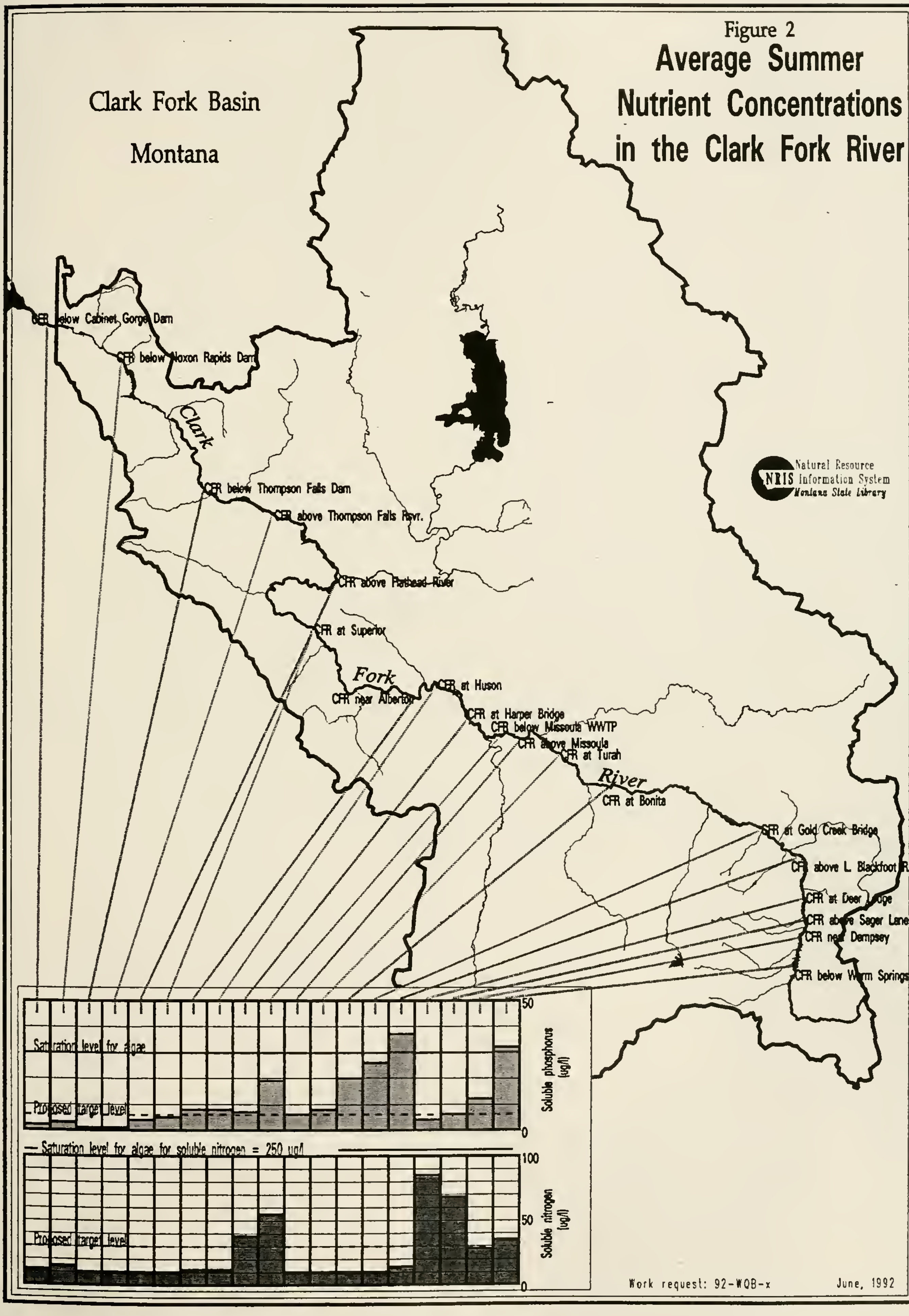
Figure 2
Average Summer Nutrient Concentrations in the Clark Fork River
Clark Fork Basin
Montana
CFR below Cabinet Gorge Dam
CFR below Noxon Rapids Dam
Clark
CFR below Thompson Falls Dam
CFR above Thompson Falls Rsvr.
CFR above Flathead River
CFR at Superior
Fork
CFR near Alberton
CFR at Huson
CFR at Harper Bridge
CFR below Missoula WWTP
CFR above Missoula
CFR at Turah
River
CFR at Bonita
CFR at Gold Creek Bridge
CFR above L. Blackfoot R.
CFR at Deer Lodge
CFR above Sager Lane
CFR near Dempsey
CFR below Warm Springs
NRIS Natural Resource Information System
Montana State Library
Saturation level for algae
Proposed target level
Soluble phosphorus (ug/l)
50
0
Saturation level for algae for soluble nitrogen = 250 ug/l
Soluble nitrogen (ug/l)
100
50
0
Work request: 92-WQB-x
June, 1992

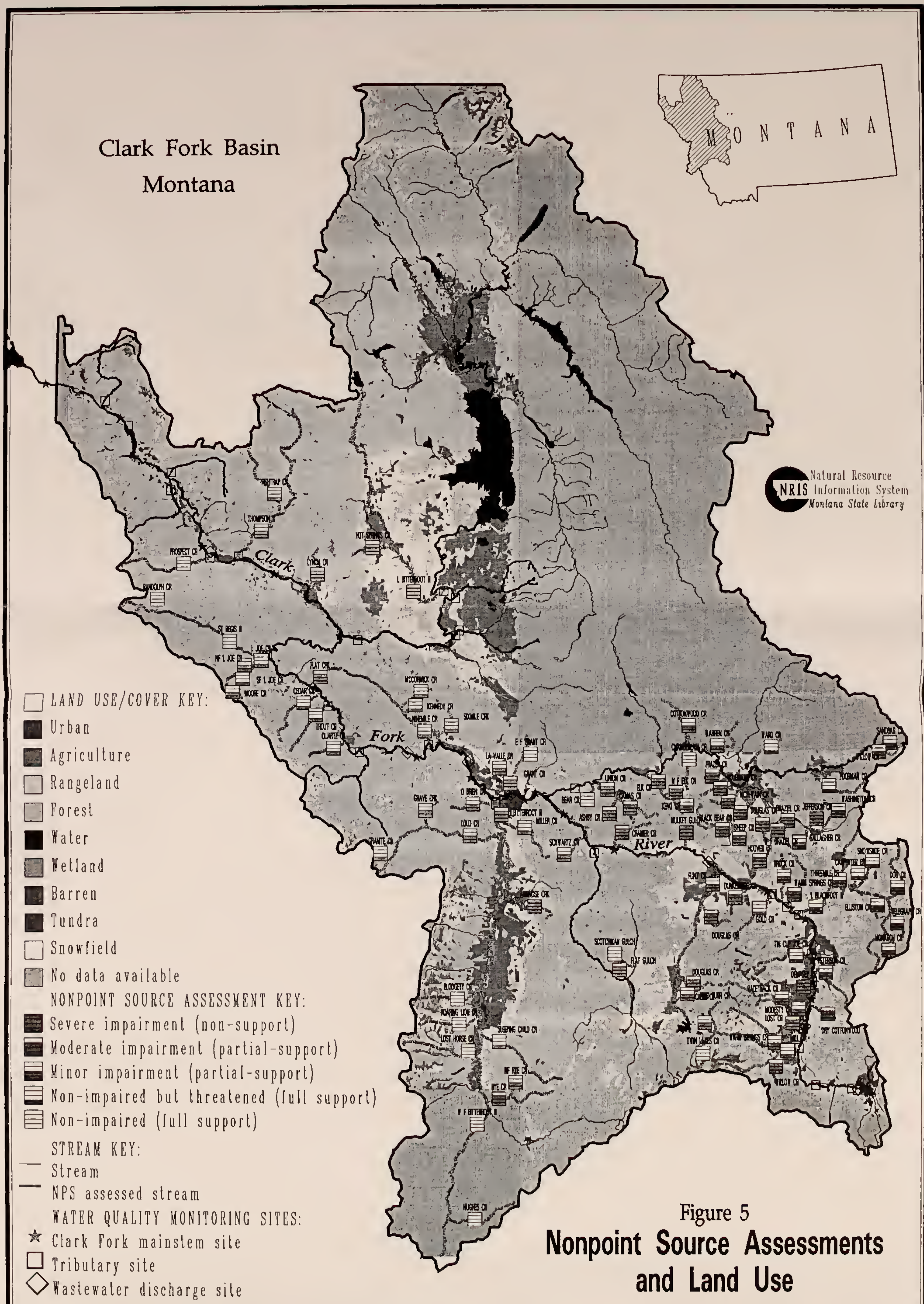

Figure 5
Nonpoint Source Assessments and Land Use

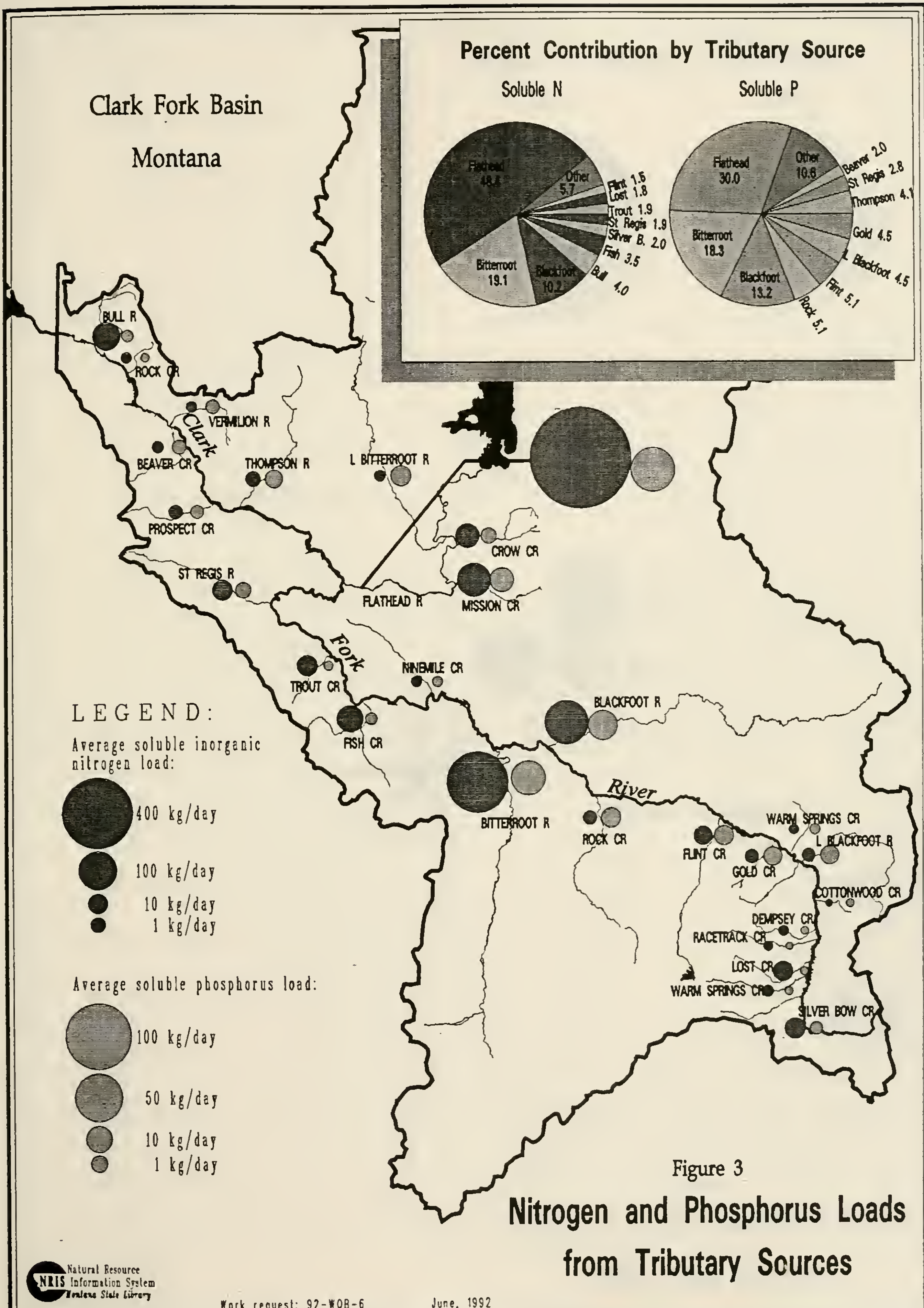

Figure 3

Nitrogen and Phosphorus Loads from Tributary Sources

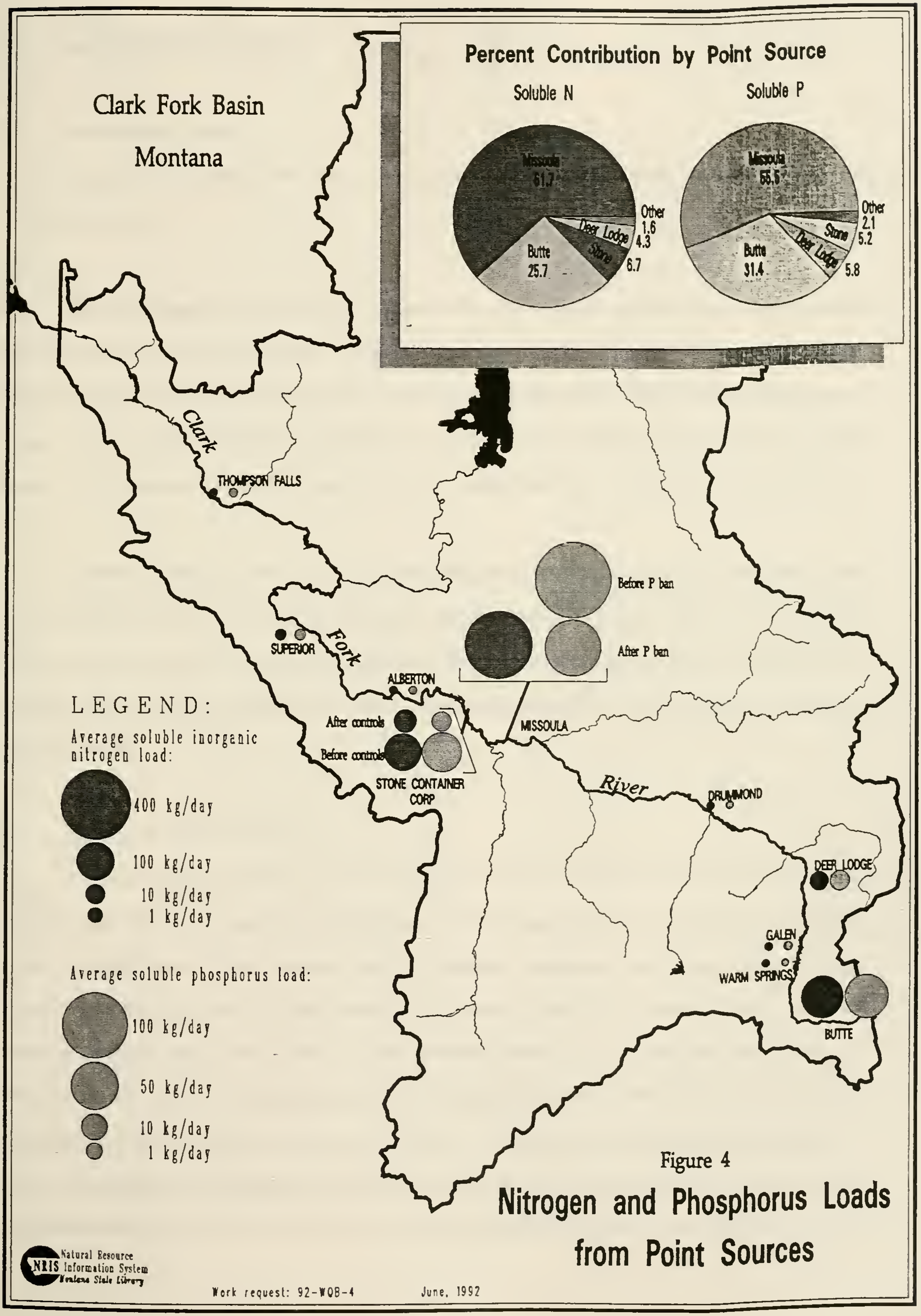

Figure 4

Nitrogen and Phosphorus Loads from Point Sources

IV. MANAGEMENT STRATEGY

A. Management Goals

There are two water quality management goals for the Clark Fork-Pend Oreille Basin specific to the 525 Project:

1. Reduce instream ambient nutrient concentrations in the Clark Fork River from its headwaters to the Flathead River confluence to reduce attached algae levels sufficient to eliminate associated water quality standards violations and to restore all present and anticipated beneficial water uses impaired by algae. These uses include cold water aquatic life, recreation and aesthetics, irrigation, and public water supply. Affected water quality standards include, but may not be limited to, dissolved oxygen and pH.

2. Maintain or reduce current rates of nutrient discharge (loading) in the Clark Fork River at the Montana-Idaho border in order to protect against accelerated cultural eutrophication in Lake Pend Oreille. In the event the State of Idaho develops information which would support the adoption of specific maximum recommended loading rates, these values would be used by the State of Montana as target levels.

B. Benefits of Nutrient Control

A comprehensive program to control nutrient sources in the Clark Fork Basin could have many benefits depending on its reach and effectiveness. Growth rates and maximum densities of attached algae would decrease. Algae's current impact on recreation, aesthetics, cold water aquatic life, and irrigation would be reduced. Drinking water supply options would be increased because treatment costs to eliminate algae-caused taste and odor problems would be less. Improved water clarity is expected during autumn, when cooler water temperatures cause attached algae to die, decompose, and become suspended in the water column. The amount of surface foam, also attributed to decaying algae, should decrease. Respiration of the river's reduced algae community should decrease, leaving more dissolved oxygen in the river for trout and aquatic invertebrates. Violations of state water quality

standards for dissolved oxygen should become a thing of the past. Finally, the threat of eutrophication in Lake Pend Oreille would be substantially reduced.

C. Water Quality Authority

The federal Clean Water Act, as amended, requires states to monitor surface waters for toxic and conventional pollutants, to assess sources and causes of pollution, to report water quality conditions and trends to EPA and Congress, and to prepare plans to control pollution (P.L. 92-500). The Montana Water Quality Act requires the Montana Department of Health to provide a comprehensive program for the prevention, abatement, and control of water pollution (75-5-101 et seq, M.C.A.). The Montana Surface Water Quality Standards designate water use classifications for all surface waters in the state and establish standards for protecting, maintaining and improving their quality and potability (ARM 16.20. Revised, June 1988).

Nutrients, however, are a group of pollutants not specifically addressed in the standards in terms of numeric criteria. Instead, compliance with water quality standards must be based on the general narrative criteria pertaining to the protection of aquatic life, avoidance of biological nuisances, and the protection of designated uses. In situations where dissolved oxygen and pH are secondarily affected by nutrient-caused algal growth, numeric criteria are available in the standards. Given these factors, regulatory control of nutrients in Montana surface waters is best achieved through site-specific investigations to determine the nutrient concentrations that will prevent nuisance plant growths in any given waterbody.

D. Existing Control Programs

Controls on nutrients to slow down or reduce eutrophication can be implemented by: treating wastewater and limiting its discharge to surface waters, limiting or banning the use of phosphates in certain products (e.g., detergents), reducing soil erosion, putting voluntary restrictions on the use of lawn fertilizers, placing and maintaining septic tanks properly, treating urban stormwater runoff, and encouraging proper land use activities. Many of these control efforts require strong citizen support and

voluntary participation; others require relatively expensive treatment operations. Many of these measures fall under the oversight of existing state and federal programs.

A nutrient control strategy for the Clark Fork Basin logically should consider and build upon the pollution control measures which are already in place. A number of programs, statutes and planning efforts are in effect now or will be implemented in the near future. Each of these will offer some relief to the current nutrient problems or, at a minimum, slow down future degradation. Brief summaries follow:

1) Montana Pollutant Discharge Elimination System (MPDES) Program

The goal of the MPDES program is to control point source discharges of wastewater so water quality in the receiving streams is protected. Water quality levels required to maintain beneficial uses of the receiving streams are set forth in the Water Quality Standards (WQS).

All point sources of wastewater discharge are required to obtain and comply with MPDES permits. The effluent limitations and other conditions contained in MPDES permits are based upon preservation of the WQS, with certain categories of wastewaters requiring treatment to federally-specified minimum levels (technology-based) in addition to WQS requirements. WQS requirements for discharge pollutant levels are calculated at the average design wastewater flow and the seven-day, ten-year low streamflow (7Q10) in the receiving stream. At streamflows below the 7Q10, the WQS and MPDES do not give further protection from pollutant discharges.

2) State Nondegradation Rules

The Nondegradation Rules are a part of the WQS that apply to new or increased sources of pollution. These rules prohibit increases in discharges of toxic and deleterious materials to state waters, unless it is affirmatively demonstrated to the Board of Health and Environmental Sciences that a change is justifiable as a result of necessary economic or social development and will not preclude present and anticipated use of these waters. Some common pollutants limited under Nondegradation are nutrients, heavy metals, and toxic organic pollutants. These same pollutants could also be limited under the WQS in existing discharge permits. The difference is that WQS levels are calculated to achieve less than

chronic toxicity levels instream at 7Q10, whereas nondegradation limits in new or enlarged point source discharges would be set at baseline instream concentrations.

3). Total Maximum Daily Load Process

Each MPDES permit issued is designed to protect the receiving stream quality at the point of discharge. In addition, recognizing the dynamic nature of streams and the potential additive or cumulative effects of pollutants, MPDES permits also address stream reach or basin-wide pollution problems. Section 303(d) of the Clean Water Act requires states to identify and rank waters that do not meet applicable WQS with technology-based controls of wastewater discharges alone. A calculation process called total maximum daily load (TMDL) is then used to apportion allowable pollutant discharge levels among the various dischargers in a stream reach or basin where WQS are threatened. If reductions of a given pollutant are found necessary to meet standards, the TMDL process is used to apportion the reductions among the dischargers in that reach or basin. It is the intent of the TMDL process to address all sources of pollution. Where nonpoint pollution sources contribute to standards violations, they must also be addressed under TMDL and controls put in place. Section 303(d) TMDLs do not bring additional regulatory authority to pollution control programs. They simply provide a mechanism for implementation of the controls needed to protect the designated uses of waterbodies.

The Clark Fork River from its headwaters to the Idaho border recently has been placed on the state's list of high priority waterbodies for TMDL development in the 1992-1994 biennium.

4) Nonpoint Source Pollution Control Program

Nonpoint source pollution (NPS) originates from diffuse runoff, seepage, drainage or infiltration and is the major cause of surface water quality and aquatic habitat degradation in Montana. Major activities that cause nonpoint source pollution are, in descending order of importance, agriculture, hydromodification, mining and forest practices, (MDHES, 1990). Montana was directed to develop a nonpoint source pollution control program under Section 319 of the 1987 federal Clean Water Act amendments. The Montana Nonpoint Source Management Plan designates administrative responsibilities and establishes a framework for the identification, resolution and prevention of nonpoint source problems (MDHES, 1991).

Montana's nonpoint source pollution control program is a cooperative, interagency effort. The Water Quality Bureau has oversight responsibility for the implementation of the management plan. The U.S. Forest Service and Bureau of Land Management are responsible for program implementation on lands under their jurisdiction. Local Conservation Districts are responsible for program implementation on non-federal lands. A number of other state and federal agencies provide technical and financial support to the program.

Resolving and preventing nonpoint source pollution problems in Montana is an enormous challenge. Nonpoint source problems are found in virtually every major drainage in the state and they involve innumerable land uses and management practices. The state's nonpoint source management plan focuses on three major areas: 1) development and implementation of "best management practices" or BMPs, 2) watershed reclamation/demonstration projects, and 3) public education. Due to its nature, nonpoint source pollution is best addressed through prevention and education.

5) Upper Clark Fork Water Allocation Management Plan

Senate Bill 434 passed by the 1991 Montana Legislature directed that a steering committee be formed and a management plan developed to optimize beneficial water uses in the upper Clark Fork Basin. The legislation was prompted by an over-appropriation of water rights and resulting conflicts between water users, management agencies, and special interest groups. This planning process will examine all current and anticipated water uses in the basin and attempt to arrive at a balanced solution

which protects all of them. The management plan is scheduled for completion in December 1994. The implementation of this plan may provide some relief to the problems caused by high nutrients in the Clark Fork if instream flows are enhanced or if nutrient sources are addressed.

6) Superfund Program

The U.S. Environmental Protection Agency, the Montana Department of Health and Environmental Sciences, Atlantic Richfield Company, and local communities are currently working together to address environmental contamination problems at four Superfund sites in the Clark Fork River Basin. These sites are the Silver Bow Creek/Butte Area Site, Anaconda Smelter, Milltown Reservoir, and the Montana Pole Site. Reclamation efforts are underway to alleviate soil and water contamination resulting from historic mining and smelting wastes and organic compounds from a former wood treating operation. Many of the remedial actions implemented under this program will have positive influences on point and nonpoint sources of nutrients in the Clark Fork Basin. However, there may be some tradeoffs. The stabilization and revegetation of bare tailings areas and eroding streambanks will reduce sediment inputs to the river and curb phosphorus loading. Reconstruction and improved operation of the Warm Springs Ponds on Silver Bow Creek can be expected to enhance the level of instream treatment provided to Butte's municipal wastewater discharge. A reduction in metals toxicity resulting from waste cleanup should increase Silver Bow Creek's ability to attenuate nutrients from Butte's wastewater discharge. This would decrease nutrient concentrations in the upper Clark Fork but could result in the development of nuisance algae in Silver Bow Creek. In order to restore all beneficial uses in Silver Bow Creek, additional treatment or other disposal options will eventually be necessary for the Butte wastewater.

7) Tribal Water Quality Programs

The Flathead Reservation of the Confederated Salish and Kootenai Tribes has authority over water quality in a portion of the Flathead River Basin. A comprehensive water quality management plan has been developed by the tribe which addresses control of point and nonpoint pollution sources. Tribal

water quality programs will provide a framework for addressing a number of important nutrient sources in this jurisdictional area.

8) U.S. Bureau of Reclamation Flow Optimization Study

The Bureau of Reclamation, in cooperation with the Montana Department of Natural Resources and Conservation, is conducting modeling studies to evaluate the relationship between streamflows and water quality conditions in the lower Clark Fork and Flathead Basins. Study results are expected to include recommendations for water management in portions of the Clark Fork Basin affected by hydroelectric dams and reservoirs.

9) Flathead Lake Phosphorus Control Strategy

A strategy is in place for controlling and monitoring the discharge of phosphorus to Flathead Lake. The plan, which was developed by the Water Quality Bureau and others and adopted in 1984, includes advanced treatment of municipal wastewaters, a ban on the sale of high-phosphate detergents, and various nonpoint source control measures (MDHES, 1984). The plan affects all of the Flathead River Basin upstream of Flathead Lake and is intended to reduce the threat of accelerated eutrophication in that waterbody. The Flathead Basin makes up about 40 percent of the total Clark Fork Basin drainage area. Thus, nutrient controls, at least for phosphorus, are already in place in a significant portion of the Clark Fork-Pend Oreille watershed.

10) Phosphorus Detergent Bans

In addition to the Flathead Basin, bans on the sale of laundry detergents other than low- or no-phosphate varieties have been adopted in the communities of Missoula, Superior and Alberton. These actions have been highly successful in reducing phosphorus discharges to the Clark Fork from the respective municipal wastewater treatment facilities. Missoula's ban has been the most effective, with documented reductions in phosphorus loading exceeding 40 percent. Recent monitoring information suggests the effect of these bans has extended beyond the intended target areas, perhaps by reducing the availability of certain high-phosphorus products in non-ban communities.

11) Nutrient Controls at Stone Container Corporation Missoula Mill

Nutrient addition rates to the wastewater treatment system at this facility have been markedly reduced over the past six years. As a result, nutrient concentrations in wastewater discharged to the Clark Fork River in 1992 are down several-fold over previous years. Targeted reductions were established in the facility's MPDES discharge permit which expired in September 1991. A new five-year permit will be developed following a public review in 1992 and is likely to include more specific and more restrictive nutrient discharge limits.

E. Additional Alternatives

Nutrient management goals for the Clark Fork Basin are unlikely to be achieved solely through the water pollution control programs and nutrient control measures which are already in place. What is needed is an overall strategy--one that incorporates the relevant existing and planned programs and activities wherever possible, but which also includes new alternatives based on our increased understanding of nutrient sources. This approach is consistent with the recommendations in former Governor Schwinden's Clark Fork Basin Action Plan. It states that "regulatory agencies, industries, municipalities, and public interest groups should work to identify opportunities to reduce all forms of nutrient loading to the Clark Fork Basin" (Johnson and Schmidt, 1988). The following additional alternatives have been developed with this in mind. Alternatives are grouped into the broad categories of point source controls and nonpoint source controls. Some of the alternatives focus on reducing nutrient concentrations in the Clark Fork River in order to control nuisance algae and related problems. Other alternatives are primarily intended to reduce cumulative nutrient loading to Lake Pend Oreille. Still others are recommendations for improving regulatory oversight and control of nutrient sources over the long term.

A tabular summary of these preliminary nutrient control alternatives, together with information on lead agencies, the MDHES priority ratings, cost estimates (where available), and potential funding sources is included at the end of this section (Table 1). More detailed information on funding sources is included in a later section of this report.

Point Source Controls

Alternative 1: Evaluate the potential for summer land application of treated municipal wastewater and encourage its implementation wherever practical.

Rationale: Using treated municipal wastewater for agricultural irrigation is one potentially beneficial method of reducing the discharge of nutrients and other pollutants to surface waters. Most of the water quality problems associated with nuisance levels of algae in the Clark Fork occur during the summer. During this period, most of the nutrients that feed the algae come from wastewater discharges. (Furthermore, it is generally true that point-source wastewater discharges of nutrients can be controlled more efficiently and cost-effectively than nonpoint sources).

In the upper Clark Fork, where nuisance algae are most prevalent, wastewater discharges are responsible for about 40 percent of the nutrients available for uptake by algae during the summer months. The Deer Lodge sewage lagoon contributes about 80 percent of the wastewater nutrient loading to that reach in summer. In the middle Clark Fork, about 73 percent of the nutrients in summer come from wastewater discharges. Of that total, about 97 percent comes from the City of Missoula wastewater discharge.

If all municipal wastewater from Deer Lodge and Missoula were used for irrigation purposes from July through September, summer nutrient loading to the upper and middle reaches of the Clark Fork could decrease by as much as 30 and 70 percent, respectively. Nutrient concentrations in the reaches below these discharges would decline by as much as 70 percent or more. Target levels would be achieved for phosphorus and nitrogen in the middle Clark Fork and for phosphorus in the upper Clark Fork. Lastly, annual reductions of from 3-10 percent in soluble nutrient loading to Lake Pend Oreille could be realized. Implementation of this alternative could reduce current summer algal levels in 200 or more miles of the Clark Fork River.

The City of Missoula has evaluated land application of its municipal wastewater (Thomas, Dean and Hoskins, Inc., 1992). While a number of precautions are necessary, and legal issues relative to downstream water rights have not yet been explored, land application appears to be a viable option. Sewer rate increases of 31 percent were projected for land application of nine million gallons per day

of effluent, which is the currently underutilized design capacity of the Missoula treatment facility. Strong support of this alternative by Missoula citizens would be necessary for its adoption.

Similar opportunities may be available at Deer Lodge because agricultural land is near the treatment works, and wastewater discharge volume is relatively small. However, the relatively small population of Deer Lodge could increase per-capita costs, and financial assistance might be necessary. A feasibility study patterned after Missoula's should be performed to investigate alternatives and costs.

Other opportunities for land application of municipal wastewater in the Clark Fork Basin should be explored, especially in the Bitterroot Valley.

Alternative 2: Look into advanced treatment (nutrient removal) or alternative disposal methods for Butte municipal wastewater.

Rationale: Butte municipal wastewater contributes as much as half of the streamflow in Silver Bow Creek. As a result, Silver Bow Creek contains excessively high concentrations of nutrients, as well as toxic levels of ammonia nitrogen. Much of the nutrient loading from Butte is removed in the Warm Springs treatment ponds on lower Silver Bow Creek before it reaches the Clark Fork. Despite the reductions, the Warm Springs Ponds discharge still constitutes a significant source of nutrient loading to the upper Clark Fork. Silver Bow Creek currently does not support nuisance algae levels because growth potential is limited by the toxic levels of heavy metals from historic mining wastes. However, as the Silver Bow Creek drainage is reclaimed under the Superfund Program, and metals sources are controlled, extensive algal growth can be expected. Because of anticipated algae, dissolved oxygen and ammonia problems, Butte's wastewater discharge will then become the principal factor limiting the reestablishment of beneficial uses in Silver Bow Creek.

In the interest of long-range planning, while at the same time addressing a significant nutrient source to the Clark Fork River, options should be evaluated for improving the quality of the Butte discharge. Land application, or other methods of eliminating the discharge to Silver Bow Creek, may not be prudent. This is because the nutrient inputs to the Warm Springs Ponds are believed to enhance the metals-removal efficiency there. An extreme reduction in nutrient loading to the ponds could have

negative effects by increasing metals concentrations in the pond outflow and in the upper Clark Fork River. A cautious approach and careful evaluation of the alternatives is necessary.

The Water Quality Bureau's Municipal Wastewater Assistance Program staff may be able to provide some help to the City of Butte to investigate the costs and feasibility of various alternatives. Financial assistance in the form of low-interest construction loans may also be available. There may be options under the federal Superfund Program as well because a continuation of the existing-quality wastewater discharge will prevent recovery of Silver Bow Creek.

Phosphorus removal, such as has been done at Flathead Valley municipalities, is technically possible and could be economically feasible. Treatment to achieve an effluent total phosphorus limit of 0.5 mg/l or less would be desirable because of the small volume of dilution water in Silver Bow Creek. This alternative would reduce Butte's current rates of phosphorus discharge by about 75 percent. It could also decrease soluble phosphorus concentrations in the Clark Fork headwaters by 50 percent or more. However, it would not entirely eliminate the possibility of algae in Silver Bow Creek. Nitrogen- and ammonia-removal technology would have to be evaluated separately.

Alternative 3: Implement basin-wide bans on the sale of high-phosphorus laundry detergents.

Rationale: Phosphate in detergents is the source of much of the phosphorus discharged by municipal treatment plants. While low-phosphate and phosphate-free soap products are readily available to consumers, their effectiveness is not substantially different from other varieties. Phosphate bans have been enacted in many states and it may be only a matter of time before legislation is drafted to institute a nationwide ban.

In the Clark Fork Basin, the phosphate detergent bans in Missoula, Superior and Alberton have been a highly effective means of minimizing pollution at the source. Following the bans, phosphorus concentrations in the wastewater discharges from these communities have declined by as much as 50 percent. Reductions in phosphorus loading from wastewater facilities in non-ban communities such as Butte and Deer Lodge have also been noted. This could be a result of voluntary consumer preference for phosphate-free products or a decreased availability of the same products banned in Missoula and downstream communities.

The ban at Missoula alone decreased the amount of phosphorus discharged to the Clark Fork by about 25 tons per year and markedly decreased instream concentrations. Computer modeling predicted that after the Missoula ban was adopted, a 40 percent or greater reduction in algal levels would be seen in at least 100 miles of the river during low streamflow conditions. Similar bans should be adopted throughout the Clark Fork Basin. Adoption of bans at Butte and Deer Lodge alone could achieve a 10-percent reduction in soluble phosphorus loading to the upper Clark Fork during the summer. This assumes a 30-percent reduction in effluent P loading following the bans. Adoption of bans at all remaining basin communities would have an even greater cumulative effect and could reduce annual loading of soluble phosphorus to Lake Pend Oreille by five percent or more.

Alternative 4: Encourage municipalities and industry to adopt additional strategies to curb wastewater nutrient loading to the Clark Fork Basin.

Rationale: Many options are available for improving the quality of municipal and industrial wastewater discharges to the Clark Fork. Voluntary efforts by municipal wastewater treatment plant managers to curb nutrient discharges, either through operational changes, pre-treatment requirements, or additional treatment measures, should be one component of a basin-wide nutrient control strategy. Chemical addition, even in lagoon systems, can be an effective means of reducing nutrient discharges. Wastewater facilities discharging effluent to Flathead Lake have effectively controlled the discharge of phosphorus, primarily through the use of chemicals. The Water Quality Bureau's Municipal Wastewater Assistance Program is available to provide technical and financial assistance in this area. The Program staff have experience in nutrient control and developed and helped fund the successful Flathead Basin nutrient control strategy for municipalities. A similar strategy for municipalities in the Clark Fork Basin could be developed.

Stone Container Corporation's efforts to reduce nutrient discharges from the Missoula kraft mill demonstrate some of the measures industrial dischargers can use. Reducing nutrient addition rates to the treatment system, installing a color-removal plant, and improving spill control have all contributed to major nutrient loading decreases to the Clark Fork. Information in soon-to-be completed groundwater

studies will allow for greater control and monitoring of nutrient discharges to the river via groundwater seepage.

Alternative 5: MDHES should enforce a consistent and aggressive policy of nondegradation with respect to nutrient loading from new or enlarged point source discharges in the Clark Fork Basin.

Rationale: Wastewater discharges contribute about half of the soluble phosphorus and about a quarter of the soluble nitrogen loading to the Clark Fork River on an annual basis. During summer when nuisance algae densities are greatest, about two-thirds of the nutrient loading comes from wastewater discharges. Nonpoint source nutrient loading is difficult to control and can be expected to increase over the long term as development increases. Strict nutrient control of effluents through permit limitations will insure that point source nutrient loading will not increase above current levels. The department is conducting an internal review of the nondegradation rules at this time. This review may result in proposed changes to the law to improve consistency of application and to address "gray" areas associated with discharges from septic tank drainfields and subsurface (groundwater) discharges to surface waters. Nutrients are another area of discussion because in some cases small increases may not pose a threat to waterbodies, and nutrient removal requirements may cause an unnecessary financial burden for dischargers. This is only true where other limitations would prevent an instream or inlake response (e.g., algae growth) from occurring and where problems do not exist now. In the Clark Fork-Pend Oreille Basin however, nutrient-related problems are well documented, and any increases should not be tolerated.

Alternative 6: Adopt a "whole basin" approach to MPDES wastewater discharge permits management in the Clark Fork Basin.

Rationale: The State of North Carolina has initiated a comprehensive whole basin approach to water quality management that could serve as a model for the Clark Fork Basin. One element of this program is to organize wastewater discharge permitting schedules by basin on a five-year cycle. In other words, all major five-year MPDES permits would be adjusted over time to have concurrent expiration dates. The advantage of this approach is that a detailed, basin-wide review of all permits

in a basin could be done at one time, thus avoiding duplication of effort while at the same time providing for a more comprehensive environmental review. Special studies, computer modeling, monitoring programs, and TMDL development are organized on the same cycle. Where wasteload allocation is deemed necessary, equitable adjustments can be made to all permits at the same time. The approach is logical because it incorporates basin-wide planning, looks at all causes and sources of water quality impairment in a basin and can incorporate nonpoint source controls. It also eliminates "basin hopping" by managers and makes more efficient use of scarce resources. In the Clark Fork Basin, environmental reviews of individual wastewater discharge permits have required many hours of staff time over the past 10 years. The whole basin approach and a concurrent multiple-permit review process would facilitate public involvement and save staff time. It would also insure that the cumulative effects of multiple pollution sources would be re-evaluated every five years. This method of permitting should be considered for the Clark Fork Basin because of its many obvious advantages.

Alternative 7: Require nutrient monitoring as a condition of all wastewater discharge permits in the Clark Fork Basin.

Rationale: Several municipal and industrial wastewater discharge permits in the Clark Fork Basin have nutrient monitoring requirements. However, this requirement has not been consistently applied to all dischargers. Nutrient monitoring information, together with accurate measurements of discharge rates, is essential to establish nondegradation limits for nutrients. It is also needed to monitor the effectiveness of the treatment process and to evaluate nutrient control measures such as phosphorus detergent bans or alternative treatments. Such monitoring should include total and soluble nutrient variables, unless it can be demonstrated that a consistent relationship exists between the different forms. Nutrients in municipal wastewaters are generally almost entirely soluble, in which case the less expensive and less complicated total tests would be acceptable. This is not true for some industrial effluents which may have variable soluble to total nutrient ratios. Nutrient variables for municipal wastewaters should include total phosphorus, nitrate plus nitrite, ammonia, and Kjeldahl nitrogen. Industrial dischargers should monitor for all of the above, plus soluble reactive phosphorus (or dissolved orthophosphorus).

Alternative 8: Evaluate nutrient loading rates to the Clark Fork from groundwater seepage downgradient from the Stone Container Corporation's Missoula Mill and refine permissible MPDES nutrient discharge limits to include both direct discharges and seepage.

Rationale: A significant portion of the mill's wastewater is percolated to the shallow groundwater aquifer adjacent to the Clark Fork River. The wastewater then discharges to the river via groundwater seepage for several miles downstream of the mill. In the past it was difficult to accurately estimate the quantity of nutrients entering the Clark Fork from this source. Stone Container is nearing completion of an extensive groundwater study that will provide more precise answers to this question. When Stone's new MPDES permit is developed in 1992, nondegradation limits for nutrient discharges should be defined and should include nutrient loading from both surface and sub-surface sources. These limits, together with expanded nutrient monitoring requirements, should be incorporated into a new five-year permit.

Alternative 9: Conduct a nutrient wasteload allocation study in the Clark Fork Basin and implement the Total Maximum Daily Load (TMDL) process to control nutrient-related water quality impairment.

Rationale: The Montana Water Quality Bureau has authority to implement a TMDL in the Clark Fork Basin under Section 303(d) of the Clean Water Act. This is because water quality-limited segments of the river have been documented, and water quality standards violations occur, despite the application of conventional wastewater treatment technology in the basin. A TMDL would establish more definitive instream nutrient concentration targets for the Clark Fork River and possibly Lake Pend Oreille through computer modeling exercises. These concentration targets would then be translated into acceptable nutrient loads for different reaches of the river. Acceptable rates of nutrient discharge from all significant point and nonpoint sources would be established so instream targets could be achieved. Such a rigorous TMDL may not be necessary if a combination of other voluntary nutrient control measures is widely supported and successfully implemented in the Clark Fork Basin.

Alternative 10: Secure long-term protection for instream flows in the Clark Fork River and key tributaries to provide for adequate dilution of wastewater discharges.

Rationale: Adequate streamflows in the Clark Fork River, and inflows from tributaries with low nutrient concentrations, were found to be very important in diluting nutrient contributions from point source wastewater discharges. Thus, preserving adequate streamflows should be an integral part of efforts to reduce instream nutrient concentrations. A comprehensive plan is needed to insure the long-term availability of adequate streamflows in the Clark Fork. Gradual depletion of flows will quickly eliminate improved water quality from past and planned measures. Senate Bill 434, passed by the 1991 legislature, temporarily closed a part of the upper Clark Fork Basin to further water appropriations. In the interim, a steering committee is developing a plan for optimal beneficial water use in the upper basin. The committee should seriously consider recommending a permanent basin closure, as well as investigating environmentally safe alternatives for enhancing current streamflows.

Nonpoint Source Controls

Alternative 1: Develop, fund and implement a specific nonpoint source management plan for the Clark Fork Basin.

Rationale: Nonpoint source pollution is a major problem in the Clark Fork drainage and an important source of nutrients. Montana has a nonpoint source pollution management plan and a program to identify, resolve and prevent nonpoint source problems statewide. Many of the components of this program such as BMP development, educational programs, stream reach assessments, reclamation demonstration projects, and monitoring will benefit water quality and reduce nutrient loading to the Clark Fork over the long term. However, there is strong statewide competition for limited nonpoint source project funding, and therefore is unrealistic to expect that more than a small portion of nonpoint source-related problems in the Clark Fork Basin will be addressed in the foreseeable future.

Additional earmarked funding would be necessary to develop and implement a comprehensive nonpoint source control program specifically for the Clark Fork Basin. Under the framework of the statewide program, earmarked funding could be channelled directly to nonpoint source priorities and for educational efforts in this basin. Much information currently exists for the Clark Fork drainage against which the effectiveness of various control programs could be guaged. We are in a much better position to begin addressing nonpoint sources in the Clark Fork than in many other basins. Recommendations for specific nonpoint source nutrient control activities in the Clark Fork Basin follow.

Alternative 2: Evaluate nonpoint sources of nitrogen in the Dempsey, Lost, Mill, Willow, and Racetrack creek drainages and implement appropriate controls.

Rationale: Each of these upper Clark Fork Basin tributaries exhibits very high concentrations of soluble nitrogen relative to other streams. Their inflows cause substantial increases in nitrogen concentrations in the Clark Fork. When this information is coupled with stream reach assessments which showed impairment in more than two-thirds of upper basin tributaries, serious nonpoint source problems are suspected. Funding should be secured and further investigations begun to identify the nitrogen sources and develop control strategies. Significant reductions in nitrogen loading from these

streams would have measurable effects on algal levels in the upper Clark Fork, especially when combined with the phosphorus control alternatives.

Alternative 3: Explore alternative agricultural practices in the Gold Creek drainage to reduce phosphorus loading to the Clark Fork River.

Rationale: Gold Creek contained among the highest soluble phosphorus concentrations of all Clark Fork Basin tributaries examined. Phosphorus sources in this drainage are largely natural geologic deposits. However, recent investigations by a University of Montana graduate student concluded that irrigation practices and cattle damage aggravate phosphorus loading to Gold Creek. Irrigation dewatering of lower Gold Creek appeared to enhance the inflow of phosphorus-rich groundwater into the dewatered channel. Erosion by cattle and irrigation practices in Gold Creek tributaries (Griffen and Blum creeks) was also found to be a contributing factor (Carey, 1991). A number of recommendations for curbing phosphorus inputs to Gold Creek were made, and these should be explored in greater detail.

Alternative 4: Evaluate the sources of nitrogen in Fish and Trout creeks and the Bull River.

Rationale: These tributaries to the middle and lower reaches of the Clark Fork contained elevated concentrations of soluble nitrogen when compared to adjacent tributaries. Nonpoint sources were suspected as the cause. Better land use practices might improve the quality of these streams and decrease nutrient loading to the river. In the Bull River and Trout Creek drainages, septic tank drainfields may be contributing factors.

Alternative 5: Encourage and cooperate with the Confederated Salish and Kootenai Tribes and the Lake County Soil Conservation Service to identify and control the sources of nutrient loading in lower Flathead River tributaries.

Rationale: Mission Creek, its tributary Coleman Coulee, Crow Creek, and the Little Bitterroot River are tributaries to the lower Flathead River. They contain among the highest soluble nutrient concentrations of all tributaries examined in the Clark Fork Basin. More importantly, they were responsible for a very large share of the soluble nutrient load in the lower Flathead River. The Flathead

River below the confluences of these streams was the single largest tributary source of soluble nutrient loading to Lake Pend Oreille. These four tributaries drain areas of the Flathead Indian Reservation with highly erodible soils that suffer impacts from irrigation and other agricultural practices. Efforts to control nutrient sources in these drainages would address a major source of nutrient loading to the lower Clark Fork River and to Lake Pend Oreille. Funding should be secured and a cooperative agreement developed with the Confederated Salish and Kootenai Tribes to identify and correct problems in these drainages. Additionally, the Lake County Soil Conservation Service has initiated a cooperative water quality project on Coleman Coulee. This work should be continued and expanded to control nonpoint sources of nutrients in this very poor quality waterbody.

Alternative 6: Continue the city sewering project in the south and west portions of the Missoula area to reduce septic tank contamination of the Missoula aquifer and to control groundwater nitrogen loading to the Clark Fork and lower Bitterroot rivers.

Rationale: The City of Missoula has been installing a sewage collection system in outlying areas of the community that were previously on individual septic systems. These drainfields were believed to be among the sources of increasing nitrogen concentrations in the Missoula groundwater aquifer which supplies drinking water to the city. Recharge of nitrogen-rich groundwater from the Missoula aquifer to the lower reaches of the Bitterroot River and to the Clark Fork River below Reserve Street has been identified as an important source of nitrogen loading. The Bitterroot River contributed nearly 20 percent of the soluble nitrogen loading from all tributary sources in the Clark Fork Basin. As much as half of the Bitterroot River's nitrogen loading during summer came from Missoula aquifer seepage. As funds become available, Missoula's sewering project should continue in order to provide long-term protection to the city water supply and to reduce nitrogen discharges to the Clark Fork River. While increased nutrient loading from the Missoula wastewater treatment plant can be anticipated as additional homes are hooked up to the system, overall control of sources would be vastly improved.

Alternative 7: Conduct additional nonpoint source monitoring and investigation to identify causes and sources of water quality impairment in the Blackfoot River drainage.

Rationale: While nutrient concentrations in the lower Blackfoot River were not high, its cumulative nutrient loading to the Clark Fork River was substantial. Overall, the Blackfoot River drainage was the third most important tributary source of soluble nutrient loading to the Clark Fork River and Lake Pend Oreille. Nonpoint source stream reach assessments in the Blackfoot drainage indicated that water quality in 76 percent of all surveyed tributary streams was impaired by land use activities. Additional documentation of nonpoint source problems in Blackfoot tributaries is available in a number of reports. Given these facts, and a high level of public interest in improving the aquatic resources of the Blackfoot drainage, additional nonpoint source work is warranted. The stream reach inventory reports should be closely examined and follow-up work scheduled to document sources and identify corrective measures. Additional earmarked funding will be necessary to initiate a rigorous, corrective nonpoint source program in the Blackfoot River drainage.

Alternative 8: Secure long-term funding support to implement the use of the Blackfoot River Geographic Information System (GIS) as an aid to nonpoint source pollution control.

Rationale: The Blackfoot GIS system was developed under the Section 525 Project as a pilot scale application of GIS technology to water quality management. The system includes an integral nonpoint source computer model which allows prediction of changes in sediment delivery rates resulting from various land use prescriptions. The system should continue to be developed and its use as a planning tool widely implemented in the Blackfoot Basin. Joint funding will need to be secured to insure its continued maintenance and operation.

Alternative 9: Secure funding to implement the Clark Fork Basin Geographic Information System as a management and planning tool for control of nonpoint source pollution.

Rationale: The Clark Fork GIS system developed under the Section 525 Project has proven itself a valuable aid to water quality assessment and basin planning. Its use should be expanded to assist with the prevention of nonpoint source pollution throughout the Clark Fork Basin and to identify and

correct existing problems. By including coverages of soil types, precipitation rates, elevation and slope, land use patterns, road networks, and land ownership, the nonpoint source consequences of proposed development activities can be better evaluated. Basin-wide analyses of water quality in relation to existing land uses and other variables would allow resource managers to focus on the most disruptive practices in particular portions of the basin. Existing resources could then be allocated more efficiently, and greater water quality improvements made with a given level of effort. Additional funding will be necessary to continue the maintenance and operation of the Clark Fork GIS after September 1992.

Alternative 10: Utilize the information developed under the Section 525 Project to build support for implementation of nonpoint source reclamation demonstration projects in key drainages.

Rationale: Under the state Nonpoint Source Pollution Control Program, grants are given to local Conservation Districts to implement nonpoint source watershed reclamation demonstration projects. There is strong competition for limited funds under this program. Candidate projects are screened against predetermined criteria and then prioritized. One criterion is thorough documentation of problems and the availability of baseline monitoring data to gauge the effectiveness of control measures. Clark Fork Basin Conservation Districts should make full use of the nutrient monitoring data and nonpoint source stream reach assessments compiled under Section 525 to build support for implementation of projects in the most impacted tributary drainages.

Table I. ALTERNATIVES FOR CONTROL OF NUTRIENT SOURCES IN THE CLARK FORK RIVER BASIN

MANAGEMENT ACTION	LEAD AGENCY	PRIORITY	COST (THOUSANDS)	FUNDING SOURCE(S)
I. POINT SOURCE CONTROLS				
Implement seasonal land application of Missoula municipal wastewater	City of Missoula	High	6000 (construction only)	City of Missoula, State Revolving Fund
Implement seasonal land application of Deer Lodge municipal wastewater	City of Deer Lodge	High	405 (construction only)	City of Deer Lodge, State Revolving Fund
Implement nutrient removal or alternative disposal methods for Butte municipal wastewater	City of Butte	High	Unknown	City of Butte, State Revolving Fund, Superfund Program
Adopt basin-wide phosphorus detergent bans	Municipalities, Counties	High	Low	Clean Water Act Section 525
Secure long-term protection for instream flows in the Clark Fork River	Upper Clark Fork Water Allocation Steering Committee	High	Unknown	Unknown
Enforce an aggressive nondegradation policy with respect to nutrient sources	MDHES	High	———	Clean Water Act Section 106
Implement the TMDL wasteload allocation process for basin-wide control of nutrient sources	MDHES	High	50-500 (development of TMDL only)	Clean Water Act Sections 106, 314, 525, 303
Require nutrient monitoring as a condition of all wastewater discharge permits	MDHES	High	Low	Costs to be borne by dischargers
Refine nutrient limits for Stone Container Corporation to include surface and subsurface discharges	MDHES	High	———	Clean Water Act Section 106, Stone Container Corporation
Evaluate and implement additional measures to curb municipal and industrial wastewater nutrient discharges	Municipalities, Industries	Medium	Unknown	Clean Water Act Section 205, Municipalities, Industries
Organize wastewater discharge permits on a concurrent, five-year cycle	MDHES	Medium	———	Clean Water Act Section 106

MANAGEMENT ACTION	LEAD AGENCY	PRIORITY	COST (THOUSANDS)	FUNDING SOURCE(S)
II. NONPOINT SOURCE CONTROLS				
Develop and implement a nonpoint source management plan specifically for the Clark Fork Basin	MDHES	High	1000	Clean Water Act Sections 525, 319
Identify and control sources of nutrients in Mission and Crow creeks, Coleman Coulee, and the Little Bitterroot River	Confederated Salish and Kootenai Tribes	High	50 (Identification only)	Clean Water Act Section 525
Identify and control sources of nitrogen in the Dempsey, Lost, Mill, Willow, and Racetrack creek drainages	MDHES	Medium	25 (Identification only)	Clean Water Act Sections 525, 319
Modify irrigation practices in the Gold Creek drainage to reduce phosphorus loading	Powell County, MDHES	Medium	Unknown	
Implement additional nonpoint source reclamation demonstration projects in the Clark Fork Basin	MDHES	Medium	Unknown	Clean Water Act Section 319
Control groundwater sources of nitrogen loading to the lower Bitterroot River	Missoula County, City of Missoula, MDHES	Medium	Unknown	
Identify nonpoint sources and causes of water quality impairment in the Blackfoot River drainage	MDHES, USFS, BLM, etc.	Medium	100	Clean Water Act Section 319, etc.
Implement the Blackfoot Geographic Information System in nonpoint source pollution control	EPA, MDHES	Medium	50 - 100	Clean Water Act Sections 525, 319 EPA Watershed Project Funds
Implement the Clark Fork Geographic Information System in nonpoint source pollution control	MHDES	Medium	50 - 100	Clean Water Act Sections 525, 319
Evaluate sources of nitrogen in Fish Creek, Trout Creek and the Bull River	MDHES	Low	10	Clean Water Act Section 525, etc.

F. Selection of Action Plan

The purpose of the Section 525 Project was to assess water quality in the Clark Fork-Pend Oreille Basin and develop a plan for its enhancement. The project emphasized the cultural eutrophication problems that are the basin's most significant, unaddressed water quality issue. Montana's water quality management goals for the project are to: 1) Reduce or eliminate nutrient-caused water use impairment in the Clark Fork River, and 2) to protect water quality in Lake Pend Oreille by controlling nutrient loading in the Clark Fork River at the Montana-Idaho border. These goals can be achieved by implementing basin-wide: 1) an effective combination of voluntary nutrient control measures, or 2) a nutrient wasteload allocation process for all permitted municipal and industrial wastewater discharges and significant nonpoint nutrient sources.

Clark Fork Basin residents will be given an opportunity to help select between these courses of action and provide input on the tentative list of nutrient management alternatives discussed in the previous section. A series of public meetings are scheduled throughout the basin for mid-July 1992. Comments received at these meetings or in writing will provide the basis for the selection of a preferred alternative. A final nutrient management plan for the Clark Fork River Basin will be developed and adopted by September 1992.

G. Monitoring for Success

Preliminary instream nutrient concentration objectives, or target levels, for the Clark Fork River have been proposed in this report. These values are 6 μg/l or less for soluble phosphorus and 30 μg/l or less for soluble nitrogen. More precise criteria will be developed if modeling studies are conducted as part of a basin-wide nutrient allocation (or TMDL) study. In either case, a continued river monitoring program to evaluate progress toward achievement of these goals will be an essential component of a successful nutrient control strategy.

The Montana Department of Health and Environmental Sciences has maintained a network of fixed monitoring stations throughout the Clark Fork River drainage since 1985. The objectives of this program are to:

- identify sources of pollution in the basin
- monitor long-term water quality trends
- monitor biological health
- detect violations of water quality standards
- provide information for management decisions

The department intends to maintain this program into the future as long as funding continues to be available. A continuation of this program will provide the needed information to assess trends in nutrient concentrations and loads throughout various reaches of the Clark Fork and to evaluate overall progress toward water quality goals. However, the program will need to be expanded, or a separate program initiated, to monitor implementation and to evaluate the effectiveness of individual basin-wide nutrient management actions. The details of such an implementation/effectiveness monitoring program will need to be worked out once a final action plan is adopted. An interstate monitoring committee should be appointed to develop and coordinate a basin-wide monitoring plan which meets the needs of the Section 525 Project.

H. Interstate/Interagency Coordination

Interstate water quality goals for the Clark Fork - Pend Oreille Basin can only be achieved through the successful funding and implementation of the Section 525 management plan and a continuation of the interstate cooperation that has developed under the project. To this end, it is the strong recommendation of the 525 Project steering committee to convene a tri-state management council of senior managers from federal, state, and county agencies throughout the basin to implement the management plan recommendations and evaluate progress toward the interstate goals.

I. Funding Sources

The following have been identified as potential sources of funding for the implementation of water quality management alternatives in the Clark Fork River Basin.

Federal Funding

Clean Water Act Section 525. The Clean Water Act is up for reauthorization this year. Language has been introduced which would petition Congress to continue appropriations for the next five years in order to implement recommendations from this study and similar studies in Idaho and Washington. If included in the Clean Water Act, grants would be made available to control sources of pollution in the Clark Fork - Pend Oreille Basin. Conditions of the grant would likely parallel those of Section 525: grants would be awarded to the State's lead water quality agency which may in turn make funds available to a public or substate governmental agency for all or any portion of a project. Grants would be awarded on a 100 percent federal share, and projects must implement the recommendations of Section 525.

Clean Water Act Section 319. Grants awarded by EPA under Section 319 are administered through the states to develop BMPs for nonpoint sources not listed in the state water quality standards, evaluate BMPs for effectiveness in controlling water pollution, institute improvements to existing nonregulatory and regulatory programs to achieve adequate implementation of the nonpoint source pollution management feedback loop, and develop demonstration projects on methods used to control nonpoint source pollutants from agriculture, forestry, and mining. A 40 percent non-federal share is required for Section 319 grant awards.

Clean Water Act Section 601. This section authorizes EPA to make capitalization grants available to the states for the purpose of establishing a State Revolving Fund Program. This program, administered by MDHES, makes low-interest loans available to public and governmental bodies. Interest terms are 4 percent for 20 years. Funding is available for up to 100 percent of project costs. The public body must secure the loan either with a revenue bond or a Local Improvement District. This program provides financial assistance to cities to upgrade or construct sewage treatment facilities.

Agricultural Conservation Program. The Agricultural Stabilization and Conservation Service (ASCS) of the USDA administers cost-share programs to pay part of the costs of BMPs which reduce erosion and sediment delivery and/or save water. In Montana, the ASCS cost-shares between 50 and 75 percent of the installation costs (up to $3,500 per year) for qualifying conservation practices. Cost-sharing is provided under annual agreements or under 3- to 10-year long-term agreements. Landowners may group together to solve soil and water conservation problems and be eligible for up to $10,000 annually. These group projects are known as pooling agreements.

Conservation Reserve Program. The Conservation Reserve Program (CRP) was authorized by the Food Security Act of 1985. ASCS administers the financial and compliance provisions of the CRP. Under the CRP, producers enter into a contract to place highly erodible crop land into a conservation reserve for a 10-year period. The producer seeds the land to permanent cover to control erosion. Producers agree not to harvest, graze or crop the land for 10 years. Acreage basis, allotments and quotas are reduced proportionately for the 10-year contract period. A significant change in the CRP program as of February 1988 allows the inclusion of areas dedicated to a vegetative filter strip along streams and permanent waterways. This strip, to be planted to grass, shrubs or trees, will normally be between 66 and 99 feet in width and should increase streambank stability while reducing the amount of sediments, nutrients and other chemicals reaching water courses. Areas under CRP contract as filter strips must have previously been cropland and do not have to meet erodibility criteria of other CRP lands.

Forestry Incentives Program. The Forestry Incentives Program, authorized in 1973, provides cost-sharing for tree planting and timber stand improvement with private landowners. The federal share of these costs ranges up to 65 percent. The maximum cost-share is $10,000 annually. The program goals are to increase timber production and improve the environment.

Rural Clean Water Program. The experimental Rural Clean Water Program, authorized in agricultural appropriations legislation for 1980 (93 Stat. 821) and 1981 (94 Stat. 3095), provides cost-sharing and technical assistance for installing measures that control nonpoint source pollution and improve water quality in rural America. The federal cost-share level for project areas is not to exceed 75 percent unless waived. Participants enter into long-term (three to 10 years) contracts with the government.

Soil Conservation Service (SCS). The SCS administers three major programs providing financial assistance to projects which may reduce pollution from nonpoint sources. These programs are Public Law 566, the Great Plains Conservation Program, and the Resource Conservation and Development Program.

Farmers Home Administration. The Farmers Home Administration (FmHA) makes loans and grants in rural areas. Several of these below-market-rate loans benefit water quality concerns. Soil and water loans are made to individual farmers and ranchers to develop, conserve and properly use their land and water resources and abate pollution. Loans are authorized to supplement other programs of the USDA such as the Small Watershed Protection and Flood Prevention Act (PL566) and the Resource Conservation and Development (RC&D) project activities.

Superfund Program. The Superfund program was created by Congress in 1980 to identify, investigate, and clean up hazardous substances that have been or may be released into the environment. EPA has initiated Superfund activities in the Clark Fork Basin primarily because of the problems left by more than 100 years of mining and processing operations. Waste disposal practices have resulted in the contamination of soils and water by metals and other substances throughout a large area of the upper basin.

The Superfund program provides for investigation and cleanup of hazardous wastes by either the potentially responsible party (PRP) or the government. If there is a PRP, EPA and/or the state oversees the cleanup efforts by the PRP through an administrative order. If there is no PRP, or the PRP declines to undertake the studies and cleanup efforts, EPA conducts the studies or provides funds to the state to do so. The PRP is provided the results of the studies and is asked to conduct appropriate cleanup. If the responsible party refuses, EPA may use resources from the Superfund to clean up the

site and then seek to recover up to three times the cost of the cleanup from the responsible party. If the responsible party undertakes the recommended cleanup, EPA oversees the activity through a court-ordered consent decree.

State Funding

Renewable Resource Development Program (RRD). Program Assistance: The RRD Program was established by the Montana Legislature in 1975. (Authority: Title 90 Chapter 2 MCA). The law states that the purpose of the program is to "develop renewable natural resources that will preserve for the citizens the benefit of the state's natural heritage and to ensure that the quality of existing public resources such as land, air, water, fish, wildlife, and recreational opportunities are not significantly diminished by developments supported by this part." In order to do this, the Renewable Resources Development program may provide funds "for the purchase, lease, or construction of projects for the conservation, management, utilization, development, or preservation of the land, water, fish, wildlife, recreational, and other renewable resources in the state; for the purpose of feasibility and design studies for such projects; for development of plans for the rehabilitation, expansion, or modification of existing projects; and for such other and further similar purposes as the legislature may approve." Only public entities are eligible for the RRD Program.

Water Development Program. The Water Development Program was established in 1981 by the Montana Legislature to promote and advance the beneficial use of water and to allow the citizens of Montana to achieve full use of the state's water by providing grant and loan financing for water development projects and activities. Projects and activities must be water-related and may be for feasibility work, demonstration projects or construction projects. Eligible proposals include rehabilitation of irrigation projects, dam or reservoir construction, control programs for saline seep, groundwater investigations, development of water-based recreation facilities, streambank stabilization and other erosion-control programs, development of water supply, water treatment, or rural water systems, and development of gravity sprinkler irrigation systems. Public entities and private individuals, partnerships, and corporations are eligible to apply.

Reclamation and Development Grants Program (RDGP). The RDGP was developed to fund projects that indemnify the people of the state for the effects of mineral development on public resources and that meet other crucial needs serving the public interest and the total environment of the citizens of Montana. The purposes of the program are to:

1. Repair, reclaim, and mitigate environmental damage to public resources for nonrenewable resource extraction; and
2. Develop and ensure the quality of public resources for the benefit of all citizens.

Entities eligible to apply for grants under the program include any department, agency, board, commission, or other division of state government or any city, county, or other political subdivision or tribal government within the state.

To be eligible for funding under the program, the proposed project must provide benefits in one or more of the following categories:

1. Reclamation of land, water, or other resources adversely affected by mineral development;
2. Mitigation of damage to public resources caused by mineral development;
3. Research, demonstration, or technical assistance to promote the wise use of Montana minerals, including efforts to make processing more environmentally compatible;
4. Investigation and remediation of sites where hazardous wastes or regulated substances threaten public health or the environment; and
5. Research to assess existing or potential environmental damage resulting from mineral development.

If sufficient eligible and qualified applications satisfying the mineral development objectives are not received or if there is a crucial state need, the department may evaluate and the governor may recommend the legislature approve funding for projects that:

1. Enhance Montana's economy through the development of natural resources; or
2. Develop, promote, protect, or further Montana's total environment and public interest, including the general health, safety, welfare, and public resources of Montana citizens and communities.

To be eligible for funding under the RDGP, a project must:

1. Be technically and financially feasible;
2. Be the best cost-effective alternative to address a problem or attain an objective;
3. Comply with statutory and regulatory standards protecting environmental quality; and
4. Be from an applicant able and willing to enter into a contract with the department for the implementation of the proposed project or activity.

A project is not eligible for funding under the RDGP to the extent it is eligible for and can reasonably be expected to receive funding from other state or federal reclamation programs or any other program or act that provides funding to accomplish remedial action for environmental damage, or if the project is permitted under other state mineral reclamation or oil and gas programs.

A proposed project is not eligible for funding under the RDGP if there is a liable party which would be relieved of financial or legal responsibility and which can reasonably be expected to be held responsible.

Conservation District Project Grant Program - HB 223. The Conservation District Project Grant Program (HB 223) was established by the 47th Legislature in 1981 under Title 15, Chapter 35, Section 108 (3)(h), MCA. One-half of one percent of the coal severance tax funds are available to conservation districts for special projects. Grant funds are available on the basis of need for any purpose authorized by conservation district law - 76-15-4, MCA. To receive funds, districts must be able to show the need for additional funds beyond those available through statutory authority (county mill levies). The project or purpose of the project must show a public benefit as well as a soil and water conservation benefit. Grant funds can be used for planning, feasibility studies, demonstration of conservation techniques, or construction of projects. Districts can also use the funds for grants or loans as long as they advance the purpose of conservation district programs.

The HB 223 program is administered by the Conservation Districts Division of the Montana Department of Natural Resources and Conservation (DNRC). The department develops application forms and solicits applications, which are submitted to DNRC quarterly. Applications must include information to enable technical, environmental, economic, and financial feasibility assessments as well as county commissioner verification that the district has levied the full 1.5 mills allowed by law.

Project proposals are reviewed by the department and ranked by the Resource Conservation Advisory Council. Recommendations are then made to the director of DNRC who makes the final funding decision. The DNRC then negotiates contracts with the conservation district for project implementation. HB 223 contracts include a detailed scope of work defining what is to be accomplished, a completion schedule, and a project budget. Disbursement of funds is coordinated with the project schedule and budget as funds are available. Contract agreements also call for quarterly and final reports which are used in conjunction with field visits to monitor project progress and completion.

River Restoration Program. The 1989 Legislature passed the "River Restoration Program." Funded by an added charge on fishing licenses, this program is expected to generate $120,000 to $130,000 per year to help preserve and restore aquatic habitat in rivers and streams of recreational and economic importance to Montana. Administered by the Department of Fish, Wildlife and Parks, eligible projects will restore streambeds, banks and associated adjacent lands to conserve and enhance fish and wildlife habitat. The program may pay up to 100 percent of the total project cost.

Local Funding.

Local county governments have statutory authority to apply tax revenues toward water quality management projects. Missoula County has the largest tax base in the immediate Clark Fork River watershed, and their municipal wastewater discharge is among the largest sources of nutrients in the basin. Missoula County and other counties in the basin should be encouraged to play a proactive role in participating in the implementation of additional nutrient control measures.

Private Funding.

No funding sources have been identified from the private sector other than the cost of additional nutrient control measures which may be required of permitted industrial wastewater dischargers.

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